

WHAT IS CLAIMED IS:

1. A fuel injection device, comprising:  
an actuator;  
5 a displacement amplification chamber for amplifying an amount of displacement of the actuator;  
a low pressure fuel passage; and  
a replenishment fuel passage that places the low pressure fuel passage and the displacement amplification chamber in communication and has a check valve which  
10 allows a fuel to flow only toward the displacement amplification chamber, wherein the replenishment fuel passage has a throttle portion.
2. The fuel injection device according to claim 1, wherein the throttle portion of the replenishment fuel passage is formed so as to extend vertically upward or at a  
15 predetermined angle when the fuel injection device is installed.
3. The fuel injection device according to claim 2, wherein a fuel stagnation space is formed at an immediately upstream side of the throttle portion of the replenishment fuel passage.  
20
4. The fuel injection device according to claim 1, wherein a large-diameter piston that is displaceable by the actuator and a small-diameter piston that faces the large-diameter piston via the displacement amplification chamber are provided, and at  
25 least one portion of the replenishment fuel passage extends from a peripheral portion of the large-diameter piston which is located at a side relatively close to the actuator, to the displacement amplification chamber, via an interior of the large-diameter piston.
5. The fuel injection device according to claim 4, wherein the interior of the  
30 large-diameter piston comprises a dead-end hole that is formed as a portion of the replenishment fuel passage along an axial center of the large-diameter piston, the dead end hole being closed at an upper portion and opened at lower portion so as to be connected in communication to the displacement amplification chamber.

6. The fuel injection device according to claim 4, wherein the check valve is configured such that the interior of the large-diameter piston is placed in communication to or shut off from the displacement amplification chamber by operating the check valve.

5

7. The fuel injection device according to claim 4, wherein  
a sectional area of the peripheral portion of the large-diameter piston located close to the actuator is smaller than a sectional area of another peripheral portion of the large-diameter piston located close to the small-diameter piston; and  
10 the fuel stagnation space is formed between the peripheral portion of the large-diameter piston located close to the actuator and a body of the fuel injection device.

8. The fuel injection device according to claim 4, wherein the throttle portion is formed so as to extend vertically upward or at a predetermined angle from the fuel stagnation space towards the interior of the large-diameter piston.

15

9. A fuel injection device, comprising:  
an actuator;  
a displacement amplification chamber for amplifying an amount of  
20 displacement of the actuator;  
a low pressure fuel passage; and  
a replenishment fuel passage that places the low pressure fuel passage and the displacement amplification chamber in communication and has a check valve which allows a fuel to flow only toward the displacement amplification chamber, wherein  
25 the replenishment fuel passage is formed so that at least one portion of the replenishment fuel passage extends vertically upward or at a predetermined angle when the fuel injection device is installed.

10. The fuel injection device according to claim 9, wherein a large-diameter piston that is displaceable by the actuator and a small-diameter piston that faces the large-diameter piston via the displacement amplification chamber are provided, and at least one portion of the replenishment fuel passage extends from a peripheral portion of the large-diameter piston which is located at a side relatively close to the actuator,

30

to the displacement amplification chamber, via an interior of the large-diameter piston.

5           11. The fuel injection device according to claim 10, wherein the interior of the large-diameter piston comprises a dead-end hole that is formed as a portion of the replenishment fuel passage along an axial center of the large-diameter piston, the dead end hole being closed at an upper portion and opened at lower portion so as to be connected in communication to the displacement amplification chamber.

10           12. The fuel injection device according to claim 10, wherein the check valve is configured such that the interior of the large-diameter piston is placed in communication to or shut off from the displacement amplification chamber by operating the check valve.

15           13. A fuel injection device, comprising:  
an actuator;  
a displacement amplification chamber for amplifying an amount of displacement of the actuator ;  
a low pressure fuel passage; and  
20           a replenishment fuel passage that places the low pressure fuel passage and the displacement amplification chamber in communication and has a check valve which allows a fuel to flow only toward the displacement amplification chamber, wherein the replenishment fuel passage has a fuel stagnation space.

25           14. The fuel injection device according to claim 13, wherein a large-diameter piston that is displaceable by the actuator and a small-diameter piston that faces the large-diameter piston via the displacement amplification chamber are provided, and at least one portion of the replenishment fuel passage extends from a peripheral portion of the large-diameter piston which is located at a side relatively close to the actuator,  
30           to the displacement amplification chamber, via an interior of the large-diameter piston.

15. The fuel injection device according to claim 14, wherein the interior of the large-diameter piston comprises a dead-end hole that is formed as a portion of the

replenishment fuel passage along an axial center of the large-diameter piston, the dead end hole being closed at an upper portion and opened at lower portion so as to be connected in communication to the displacement amplification chamber.

5           16. The fuel injection device according to claim 14, wherein the check valve is configured such that the interior of the large-diameter piston is placed in communication to or shut off from the displacement amplification chamber by operating the check valve.

10           17. The fuel injection device according to claim 14, wherein  
a sectional area of the peripheral portion of the large-diameter piston located close to the actuator is smaller than a sectional area of another peripheral portion of the large-diameter piston located close to the small-diameter piston; and  
the fuel stagnation space is formed between the peripheral portion of the large-  
15 diameter piston located close to the actuator and a body of the fuel injection device.